

REMARKS

Claims 1-22 are pending in the application before entry of this Amendment.

Claims 1-22 stand rejected.

Claims 14-16 and 20 are rejected under 35 U.S.C. 102(b).

Claims 1-7, 21 and 22 are rejected under 35 U.S.C. 103(a).

Claims 8 and 9 are rejected under 35 U.S.C. 103(a).

Claims 10-13 are rejected under 35 U.S.C. 103(a).

Claims 17-19 are rejected under 35 U.S.C. 103(a).

No new matter is added.

Claims 1-22 are now in the case for consideration.

Applicant requests reconsideration and allowance of the claims in light of the above amendments and following remarks.

Applicants submit that at most brief review of the amendments and arguments offered herein are needed to allow all claims, even after their Final rejection. There are no added independent claims requiring no further search. Thus entry of the amendments and allowance of all claims is respectfully requested.

At the very least, entry of the amendments is solicited as such will clarify and remove issues for any otherwise avoidable appeal.

Claim Rejections - 35 USC § 102

Claims 14-16 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Hikata, et al. (US 6,133,637).

Applicants respectfully traverse the rejections.

Hikata will be discussed at length below, with respect to Claim 1. Without conceding the Examiner's expansive reading of Hikata, applicants nevertheless hereby amend claim 14 to recites among other steps "forming a soft element including an elastomer or an epoxy resin without a filler," a combination of steps into a method nowhere shown in the known prior art. Applicants submit that claim 14, along with claims 15, 16 and 20 dependent therefrom, are allowable.

Claim Rejections - 35 USC § 103

Claims 1-7, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hikata, et al. (US 6,133,637) in view of Kondo, et al. (JP 63-240053 A).

Applicant respectfully traverses the rejections.

First, the Examiner's argument regarding claim 1 makes no mention of Kondo, from which one might conclude that, contrary to the Examiner's *obviousness* position regarding Hikata and Kondo, the Examiner thinks Hikata singularly *anticipates* claim 1. In the discussion of claim 1 on page 3 of the Office action, the Examiner refers only to Hikata and elements thereof thought to render obvious applicants' claim 1. But the Examiner does not explain what relevance Kondo might have to the obviousness of claim 1. As such, applicants can only guess what the Examiner's actual position is.

Applicants respectfully submit that, due to the incompleteness and incomprehensibility of the Examiner's position (especially in view of what applicants reasonably thought was agreement by the Examiner during a February 22, 2005 telephone interview to the allowability at least of previously amended claims 1, 2, 3 and 14—wherein the Examiner agreed that curing and drying of an epoxy resin mixed with a filler *would harden* Hikata's inner package 26 rather than producing applicants expressly claimed "soft element"), the final status of the latest Office action should be withdrawn.

The basic unfairness of the Examiner's citation of Kondo, a Japanese-language patent, along with a very *selective* English-language translation of only parts or all of the "Abstract" and "Constitution" sections is evident from the fact that any patent or technical disclosure may, *when considered as a whole*, to not suggest its combination with other prior art or to expressly or impliedly teach away from a claimed invention. Thus, without a complete translation, applicants are left to wonder what else Kondo teaches, whether in support or in contradiction of the Examiner's position and selective reading thereof. For example, as pointed out below, the Examiner states that feature 2 is a "lead frame" (see page 4 of the Office action), but reference designator 2 is not even mentioned in the translated sections. Moreover, applicants have to guess whether reference designator 6 in Fig. 3 refers instead to flexible materials 9. And applicants must guess what reference designators 7 and 8 of Fig. 1 refer to, since those reference designators also are nowhere mentioned in the translated sections. Moreover, the Examiner either asserts or somehow divines at page 4 of the Office action the "the soft element of Kondo does not contain any filler," the truth of which applicants can only guess.

Accordingly, applicant respectfully requests that the Examiner provide a complete translation of Kondo and articulate whence, therein, the Examiner's assertions derive.

Second, as far as it goes, with respect only to Hikata, the Examiner's argument is disingenuous. The Examiner states that in re claim 1, applicants' recited soft element

limitation reads on Hikata's "elastomer or epoxy resin 18." Then, in the next paragraph of the Office action, the Examiner states that in re claims 2 and 3, it instead is Hikata's "epoxy resin 26" that corresponds to applicants' soft element entire or partial side surface contact limitations. The Examiner cannot have it both ways.

Either Hikata's adhesive resin 18 or his moisture-resistant resin 26 corresponds to applicants' singular soft element limitations in independent claim 1 and claims 2 and 3 depending therefrom. Otherwise, the Examiner picks and chooses particular and disparate details from the prior art, i.e. the Examiner engages in piecemeal, hindsight reconstruction, which of course is impermissible.

In order to advance the application to allowance, applicants hereby amend claim 1 more definitely to claim their invention. Specifically, amended claim 1 recites its soft element as "as being adapted to relieve stress in the joiner between the at least one semiconductor chips and the encapsulating mold resin." This clearly distinguishes over the prior art of record, including Hikata. First, Hikata's synthetic resin adhesive 18 made of epoxy resin or elastomer adheres the two semiconductor chips 14, 16 together. It is *not* located between a semiconductor chip and the mold resin in Fig. 9 cited by the Examiner, since Hikata's inner package 26 of a different ("moisture resistance") synthetic resin interposes either of semiconductor chip 14 and 16 and outer package 22 of yet another different ("adhesibility") synthetic resin. Arguably, however, in the embodiment of Figs. 1-6 having no such inner package 26, Hikata's synthetic resin adhesive 18 is located between his semiconductor chip 14 or 16 and his outer encapsulant package 22 (see Fig. 5). Accordingly, applicants do not rely only on this distinction over Hikata.

Hikata expressly teaches at columns 5 and 6 that his inner package 26 is "formed of a synthetic resin such as an epoxy resin mixed with a filler to increase its moisture resistance." (Column 6, lines 25-27.) Hikata goes on to say that inner package 26 is formed by applying "such a synthetic resin in a liquid state and *curing and setting the resin.*" (Column 6, lines 27-29.) (Emphasis added.) One of ordinary skill in the art would conclude from these two express statements of purpose and approach that Hikata's inner package 26 is hard and impervious; not soft and certainly not being adapted to relieve stress between the at least one semiconductor chip and the encapsulating mold resin (shock absorption). This fair reading of Hikata is reinforced by the fact that shock absorption in the Hikata scheme is provided *not by inner package 26 the purpose of which is to "[protect] against moisture" but instead by outer package 22 the purpose of which is to protect the IC main chip 15 and the IC sub-chip 16 "against external force."* (Column 6, lines 46-49.) (Emphasis added.) It could not be

more clear from Hikata to one of ordinary skill in the art that Hikata's purpose is two-fold and utilizes two different hard epoxy resins—an inner one 26 for chip moisture protection and an outer one 22 for chip and leadframe shock absorption.

In summary, Hikata teaches no soft element located between a semiconductor chip and an encapsulating mold resin in a vertical multi-chip package, no such soft element more flexible than the mold resin around it, and certainly no such soft element more flexible than the mold resin around it and furthermore being adapted to relieve stress between the at least one semiconductor chip and the encapsulating mold resin.

Further, Hikata does not teach or disclose the relationship between the inner package 26 and the package 22. For example, Hikata does not disclose the inner package 26 is more flexible than the package 22. On the contrary, in the claimed invention, the soft element is more flexible than the mold resin or the encapsulant.

Kondo is no help to the Examiner here insofar as Kondo is understood, since Kondo's selectively translated disclosure teaches only flexible material sealing of a *single* semiconductor element's (rather than plural vertically stacked instances thereof) and wirings' periphery to reduce internal stress on the singular semiconductor element and its associated wiring. Such does not teach one of ordinary skill in the art—even in view of Hikata—to provide a multi-chip semiconductor package having all of the claimed elements including at least two vertically stacked semiconductor chips with a soft element located between at least one of them and an encapsulating mold resin. This is because Kondo's flexible material extends along all or a part of a top and sides of a single semiconductor chip's surface, which flexible material would prevent the inclusion of a second or subsequent vertically stacked semiconductor chip. Moreover, stacking of plural semiconductor chips is a science all its own and the peculiar internal stress forces and avenues of relief for an encapsulated, plural vertically stacked semiconductor chips package are completely different from those incident on a single encapsulated chip. This is because of the inter-chip and external interconnections required between the stacked chips, which take up excess vertical space and render difficult the task of internal stress relief electrically and physically compatible with such plural-chip and external interconnections. Accordingly, applicants submit that claim 1 is allowable.

Claims 2-7, 21 and 22 all depend from allowable claim 1 and thus are allowable. With respect to claim 6, however, the Examiner believes that because “the soft element of Hikata is formed of the same materials and structure as the applicant's claimed invention, it is also inherently configured to increase vertical mobility of the semiconductor chips against a load of the adhesive applied to the semiconductor chips upon cooling,” an apparent reference

to language of limitation found only in one or more of claims 6, 7 and 22. The Examiner's conclusion might follow from a different assertion in a different context, but here the Examiner's assertion is incorrect and the conclusion does not follow.

Not all synthetic resins are alike even though they are all synthetic resins. This should be clear from Hikata itself, which teaches a) a synthetic-resin such as an epoxy resin or elastomer used as an "adhesive" for adhering two chips together b) a synthetic resin such as an epoxy resin mixed with a filler "to increase its moisture resistance" and c) a synthetic-resin mixed with a filler in an outer package, the synthetic-resin being transfer-molded "to provide entire encapsulation" and to "[p]rotect against external force." Three synthetic resins producing three different effects due, presumably, to three different formulations.

With respect to claim 21, the Examiner states that Figure 49 of Hikata shows "there is no soft element between the chips, and when combined with Kondo, the soft element (9) of Kondo would be formed on the uppermost chip and not between the two chips of Hikata. That assertion, which is nothing more than the Examiner's hopeful conclusion, is not correct. In fact, a fair reading of the teachings of Hikata and Kondo together would not suggest their combination, since, as pointed out above, Kondo has no knowledge of and provides not insights to stress-relieved encapsulation of vertically stacked semiconductor chips in a multi-chip package. There is a completely different set of problems for vertically stacked chips in terms of stress relief within a hard molded resin, a set of problems Kondo does not even acknowledge or attempt to acknowledge, and a set of problems that Hikata solves in a very different, two-stage, hard-resin attempt involving a "cur[ed] and [set]" inner synthetic-resin, "moisture resistance" package 22 and outer synthetic-resin, "adhesibility" and "external force" protection encapsulation package 22.

The Examiner also somehow finds a "lead frame (2)" in the Kondo disclosure, despite the fact that reference designator 2 appears nowhere in the English-language "Abstract" or "Constitution" provided by the Examiner in support of the claim rejection. Applicants challenge the assertion that feature 2 in the Kondo drawings is a lead frame and traverse the rejection on this ground also.

With respect to claim 22, the Examiner asserts or somehow divines that "the soft element of Kondo does not contain any filler." Applicants challenge the assertion and traverse the rejection, since the English-language "Abstract" and "Constitution" provided by the Examiner presumably in support of such an assertion is silent on this point.

In any event, the claims are allowable because they depend from an allowable claim and add further distinctive limitations.

Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hikata, et al. (US 6,133,637) in view of Kondo, et al. (JP 63-240053 A) as applied to claim 1 above, and further in view of Derderian (US 6,569,709 B2).

Claims 8 and 9 depend from allowable claim 1 and thus are allowable.

Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozawa, et al. (US 6,215,182 B1) in view of Kondo, et al. (JP 63-240053 A).

The Examiner admits that Ozawa teaches a multi-chip semiconductor package having an encapsulant but no soft element formed on the surface of at least one of the two chips but not on surfaces therebetween. Indeed, Ozawa teaches no soft element at all. Kondo's teachings regarding the use of a flexible material over part or all of an upper or side surface of a single, encapsulated semiconductor chip does not readily combine with Ozawa's teachings. There is no motivation to modify Ozawa, which does not even acknowledge a stacking, e.g. a limited vertical mobility, problem within an encapsulated plural-chip package. And, even if motivated to combine the references, how would one of ordinary skill in the art—without benefit of applicants' disclosure—incorporate a soft element that was electrically and physically compatible with a multi-chip semiconductor package's unique inter-chip and external interconnection challenges? On which surface or surfaces of which semiconductor chip would Kondo's flexible material extend, and how? Applicants have provided the answers to the unasked question.

Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hikata, et al. (US 6,133,637) as applied to claim 14 above, and further in view of Kondo, et al. (JP 63-240053 A).

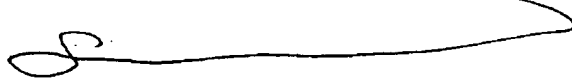
Claims 17-19 depend from allowable claim 14 and thus are allowable.

Conclusion

For the foregoing reasons, reconsideration and allowance of claims 1-22 of the application as amended is solicited. The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

Respectfully submitted,

MARGER JOHNSON & McCOLLOM, P.C.



Hosoon Lee
Reg. No. 56,737

MARGER JOHNSON & McCOLLOM, P.C.
210 SW Morrison Street, Suite 400
Portland, OR 97204
503-222-3613
Customer No. 20575

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Stormi R. Davis